MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2015/2016

ECE3076 – DATABASE SYSTEMS

(CE/ME)

7 MARCH 2016
9.00 A.M. – 11.00 A.M
(2 Hours)

INSTRUCTION TO STUDENTS

1. This examination paper consists of five (5) printed pages including cover page containing four (4) questions only.

2. Answer all questions. All questions carry equal marks (15 marks each) and the distribution of marks for each sub-question is given. The total for this paper is 60 marks.

3. Please write all your answers in the Answer Booklet provided.

Question 1

You are given a database system for photo collections for Vishnu's Studio with the following relational schema. Primary keys for each table are in **bold** and underlined.

```
Photo     (Photo_ID, Photo_Description, Photo_Date)
Customer  (Cus_ID, Cus_Name, Cus_Address)
Album     (Album_ID, Cus_ID, Order_Date, Order_Status)
Album_Pic (Album_ID, Photo_ID, Comment)
```

Notes:

- `Photo_ID`, `Cus_ID` and `Album_ID` are auto-incrementing `INT(10)`.
- `Photo_Description`, `Cus_Name`, `Order_Status` and `Comment` are `VARCHAR(255)`.
- `Photo_Date` and `Order_Date` are type `Date`.

a) Write a SQL command to create the table `Album` with proper foreign key references, where deletions from the `Customer` table should be set to null.

[3.5 marks]

b) Write a SQL command to add the `Decimal(5,2)` field `Price` into the `Album` table.

[1 mark]

c) A customer named Hussein Altab makes an order for an album worth RM12.50 on 12 January 2016. Write the SQL command to insert the necessary records into the `Customer` and `Album` tables. The Order Status should be "`For delivery`" to Mr Altab's address at "`21 Jalan Warisan Indah 8/14, Kota Warisan, Sepang`". The most recent customer's customer's `Cus_ID` in the `Customer` table was 11.
[Hint: The format for date is yyyy-mm-dd]

[4.5 marks]

d) Write a SQL to create a view called `Weddings` that displays the `Cus_Name`, `Album_ID`, `Photo_ID` and `Photo_Description` where the field `Photo_Description` contains the keyword "`wedding`".
[Hint: use % wildcard.]

[3 marks]

e) Create a trigger `remove_photo_album` such that upon the deletion of a particular album from `Album_Pic` table, the corresponding `Order_Status` field of the `Album` table will be set to the value 'Delivered/Collected'.

[3 marks]

Continued...

Question 2

Han University is implementing their convocation system to use a modern database. You are tasked as the database designer to create a proper database model for their university. The following are their business rules:

- A convocation is held every year. The university will hold many such convocations in the years to come. Every convocation is held at the same venue: the Grand Hall.
- A convocation has many sessions, spread across several days, with at least minimum one session. Each session belongs to only one convocation, regardless of which day it is on.
- A session may have several faculties participating, with at least one faculty for the session. A faculty participates in only one session.
- A session has a number of seats, with the minimum being 100 seats. Each seat belongs to only one session.
- A seat may be further divided into either student seat or guest seat, with no overlap. [Hint: use Extended ERD for this]
- Students must belong to only one faculty, while a faculty has many students, with the minimum number being 50 students.

a) Draw an Entity-Relationship diagram (ERD) to represent the conceptual model for the database based on the rules above. You must indicate all possible connectivity and cardinality information in your diagram. You may use either Crow's Foot or Chen's Notation.

[12 marks]

b) Compare and contrast the conceptual and internal models with regards to degree of abstraction, hardware dependence and software dependence.

[3 marks]

Continued...

Question 3

a) What is the purpose for normalization in the process of database design?

[1 mark]

b) Given the dependency diagram Figure 3(b) below, answer the following questions:

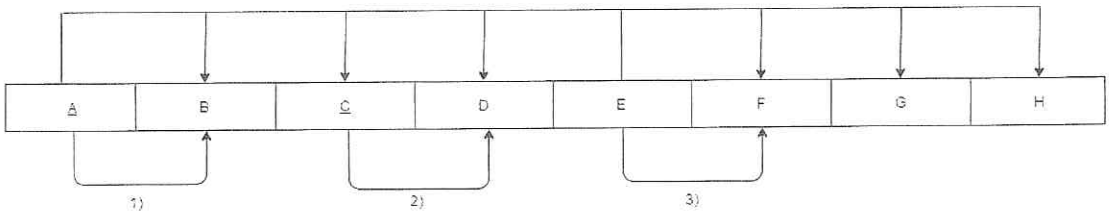


Figure 3(b)

i) From the diagram, what are the primary key attributes?

[1 mark]

ii) Label the dependencies 1), 2) and 3).

[3 marks]

iii) Explain why attributes G and H do not have dependency arrows.

[1 mark]

iv) What is the requirement for normalization to the third normal form(3NF)?

[1 mark]

v) Show the relations after normalizing the table to third normal form (3NF).
[Hint: You may use numbers for relation names. You do not need to show 2NF.]

[2 marks]

c) What is denormalization and under what circumstances should denormalization be considered?

[2 marks]

d) How does a relation satisfy referential integrity?

[2 marks]

e) Given a schema for an entity below, represent it with a table with FOUR sample records in a way that fulfills the entity integrity requirement:
`Student(Student_ID, Student_Name)`

[2 marks]

Continued...

Question 4

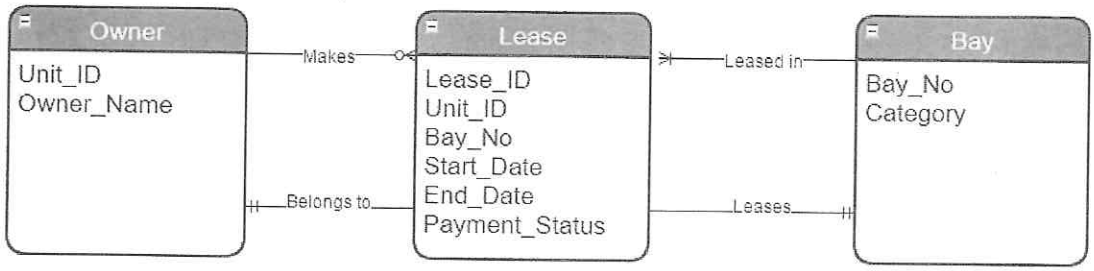
a) The following table depicts a scenario with several transactions from different users and the data items locked and required by each transaction.

Transaction	Data Items Locked	Data Items Required
T1	X11,X15	X2,X9,X12
T2	X2,X14,X16	X5
T3	X1,X5	X12,X17
T4	X7,X8,X10	X1,X6,X17
T5	X12,X17	X16
T6	X3,X4,X13	X14
T7	X6,X9,X15	X3,X4,X13

Draw a wait-for graph. Indicate the transactions that are causing the deadlock if any.

[4 marks]

b) Convert the following Crow's Foot Entity-Relationship Diagram (ERD) into its object oriented UML equivalent representation.



[7.5 marks]

c) Answer the following questions with regards to database connectivity and web technologies:

i) What is database middleware?

[1 mark]

ii) Give two examples of well-defined web server interfaces. Which one is more efficient?

[1.5 marks]

iii) What does the statement: "The web is a stateless system" mean?

[1 mark]

End of paper